

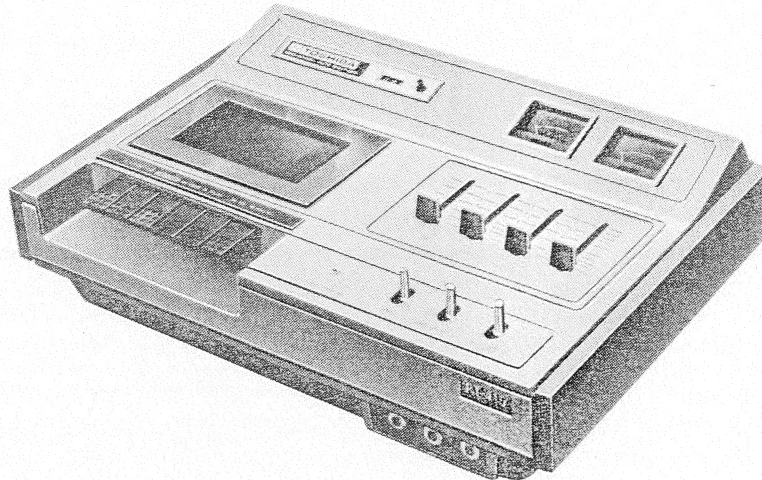


# TOSHIBA CASSETTE TAPE DECK

## SERVICE DATA

### MODEL PT-415

FILE NO. 100-067



#### SPECIFICATIONS

Usable:	Cassette Tape	Semiconductors:	ICs . . . . . 6
Tape Speed:	1-7/8 ips		Transistors . . . . . 19
Track:	4 tracks(2 channels)		Diodes . . . . . 20
Recording System:	AC bias at 85 KHz	Signal/Noise Ratio:	49 db minimum
Erasing System:	AC erase	Distortion Factor:	2 %
Level Indication:	Level Meter	Wow/Flutter:	0.2% RMS maximum
Frequency Response:	40 to 12000 Hz	Fast Forward Time:	120 seconds approx. (Using C-60 tape)
Audio Output:	1V(maximum)	Dimensions:	(W) 15"
Input Jack:	MIC., 10 Kohm		(H) 4-17/32"
	LINE IN, 820 Kohm		(D) 10-1/4"
Output Jack:	LINE OUT, 1V(maximum)	Weight:	10 lbs
Power Source:	AC 120V, 60Hz		

TOKYO SHIBAURA ELECTRIC CO., LTD.

2-1, 5-CHOME, GINZA, CHUO-KU, TOKYO, JAPAN

## TECHNICAL POINTS

## PARTS DESIGNATION AND THEIR FUNCTIONS

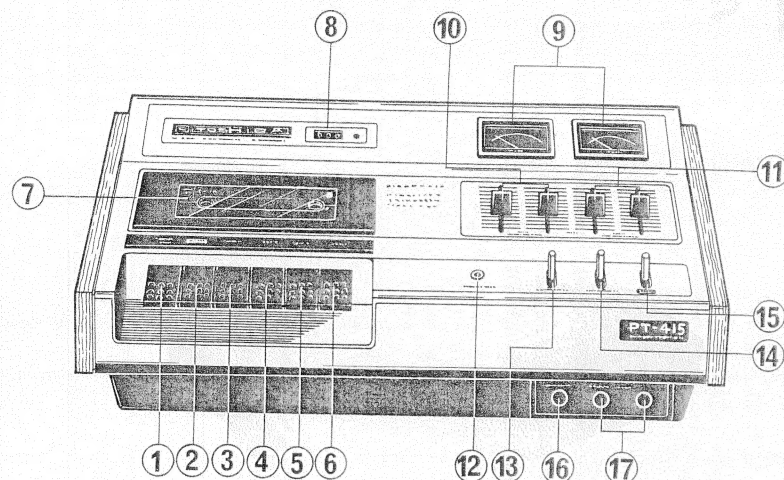


Figure 1. Designation of Parts

**1. Stop/Cassette Up Button**

During fast-forwarding, rewinding, recording or playback operation, depress this button lightly to switch off the unit; further strongly depress it to open the Cassette Compartment Lid.

**2. Recording Button**

Depress the Recording Button and the Playback Button simultaneously for recording operation.

**3. Rewind Button**

Depress the Rewind Button to rewind the tape.

**4. Playback Button**

The tape travels at normal speeds when this button is set on for playback and recording operation.

**5. Fast-Forward Button**

The tape is fast-forwarded by depressing this button.

**6. Pause Button**

Tape travel stops temporarily when this button is depressed during recording or playback operation. Second depression of the button released temporary stop mode and the unit resumes recording or playback operation.

**7. Cassette Compartment Lid****8. Tape Counter**

The recorded part on the tape can be easily located by this device when recording with this counter set to (000) position.

**9. Level Meter**

Indicates recording output level or playback output level during these operations.

**10. Playback Output Level Adjusting Knob**

Serves to adjust the output level in playback operation.

Adjust the right side knob (RIGHT) or the left side knob (LEFT) for adjustment of right channel output level or left channel's, respectively.

**11. Recording Level Adjusting Knob**

Adjusting knob for recording level.

**12. Recording Indicator Lamp**

Lights up when the unit is set for recording operation.

**13. Dynamic Noise Limiter Switch**

Setting this switch to (IN) position assures you noise-free reproduction sound.

**14. Tape Selector Switch**

When recording, selects the proper position suitable for individual tapes to be recorded. This switch can be set at any position in playback operation.

**15. Power Supply Switch****16. Headphone Jack****17. Microphone Jack****DYNAMIC NOISE LIMITER**

The DNL Noise Reduction System is an epoch-making system to improve the Signal-to-noise ratio without impairing the tonal quality too much. The PT-415 model has the Dynamic Noise Limiter built-in which assures you of noise-free sound reproduction having wide dynamic range. The noise reduction system functions only for playback operation. Therefore this system is effective with ordinary music tapes and the tapes recorded through an ordinary tape recorder as well.

**THE PRINCIPLE OF DYNAMIC NOISE LIMITER**

The basic principle of the Dynamic Noise Limiter is that it suppresses the hissing tape noises harsh to the ear by cutting off the electric signals of frequencies more than 4.5 KHz, recorded at the recording level lower than OVU by approximately 40 dB, and also that the signals with higher recording level and lower frequencies are passed by with flat response, the tonal quality being not spoiled.

**THE EFFECT OF THE DNL**

As illustrated below, the DNL suppresses the noises of over 5 KHz which have high hissing tape noise and improves the Signal-to-noise ratio of over 10 dB at 10 KHz.

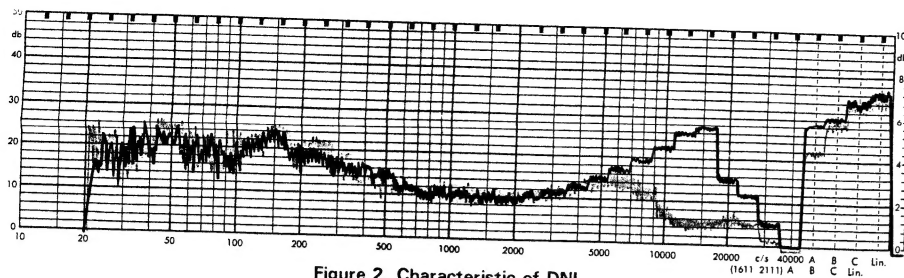


Figure 2. Characteristic of DNL

### TAPE SELECTOR SWITCH

The PT-415 model is provided with the Tape Selector Switch (TAPE SELECT) which enables the ultrahigh efficiency tape (Chrome-Dioxide tape) function sufficiently, besides functioning with the ordinary tapes.

When selecting the Tape Selector Switch from (NORMAL) to (CHROME), the unit is switched over to the optimum bias and optimum recording equalizer for the ultrahigh efficiency tapes.

Note: Ultrahigh efficiency tape (Chrome-Dioxide Tape)

This tape is generally called as "Chrome Tape" and shows an excellent performance equal to the low noise tapes usually employed in the tape decks for professional use, using Chrome-Dioxide ( $\text{CrO}_2$ ) as its magnetic substance.

### AUTOMATIC SHUT OFF

When the tape is completely wound up during recording, playback, fast-forwarding or rewinding operation, the motor stops automatically.

### MECHANICAL OPERATION

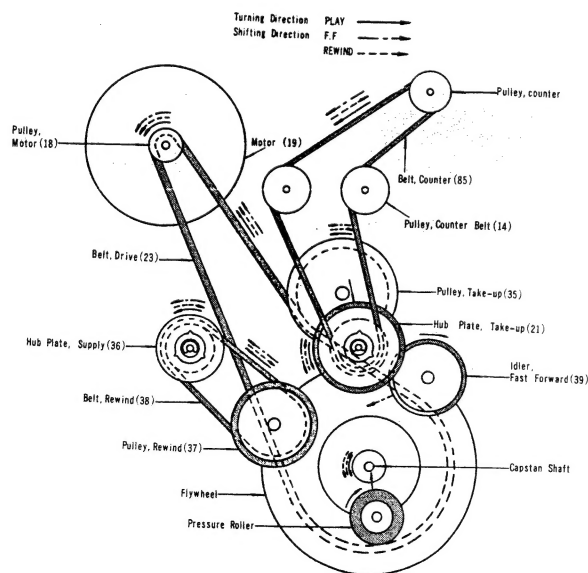


Figure 3. Stop State

### RECORD AND PLAYBACK MODE OF OPERATION (See Figure 3)

When the Play Button is pressed, the Record/Playback Head (29) and the Erase Head (28) engage the tape. At the same time, the Pressure Roller (27) contacts the capstan shaft. The motor pulley turns the Drive Belt (23) which turns the Take-up Pulley (35) and the Take-up Hub Plate (21). The Take-up Hub Plate (21) is driven by the tape which drive the counter pulley using the counter belt. The record mode is mechanically the same as the playback mode.

### REWIND OPERATION

When the Rewind (REW) Button is pressed, the power is turned on and the Rewind Pulley (37) contacts the flywheel, rewinding the tape rapidly.

### FAST-FORWARD OPERATION

When the Fast-Forward (FF) Button is pressed, the power is turned on and the Fast-Forward Lever Spring (62) presses the Fast-Forward Idler (39) against the Take-up Hub Plate (21) and Flywheel.

The motor turns the Take-up Hub Plate through the Flywheel Drive Belt and Fast-Forward Idler accelerating the tape in the forward direction.

### STOP/UP OPERATION

The pressing of Stop/Up Button activates Operation Plate (7) to unlock each of push buttons to put the unit in stop mode. Another hard push of the button operates operation plate to push up Cassette-up Lever (11) to open cassette cover.

### PAUSE OPERATION

When you wish to stop the operation of the unit temporarily during playback or recording, depress the Pause Button which disconnects the pressure roller from the capstan shaft and at the same time separates the Take-up Pulley (35) from the flywheel.



## SERVICE POINTS

## CHASSIS REMOVAL

1. Remove the four Volume Control Knobs. See figure 4.
2. Remove the six screws of the bottom cover and separate bottom cover from the cabinet by lifting upward. See figure 5.

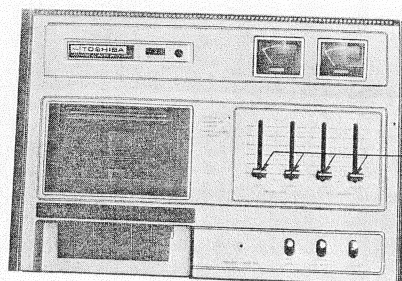


Figure 4. Location of knobs

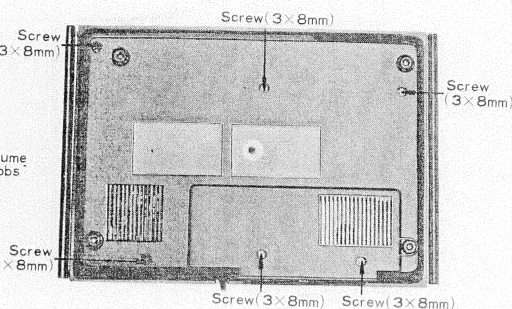


Figure 5. Location of screws

3. Remove the six tapping screws of the chassis. See figure 6.
4. Remove the chassis from the panel.

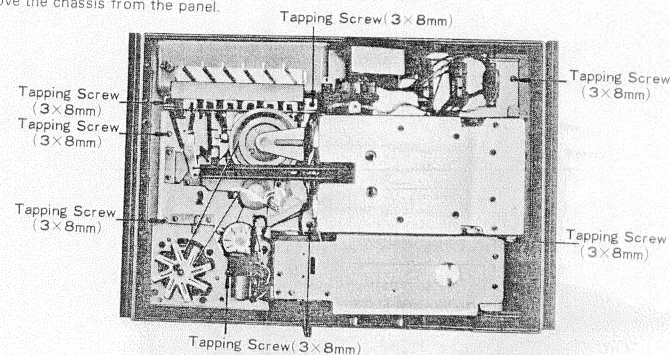


Figure 6. Location of screws

## RECORD/PLAYBACK HEAD ADJUSTMENTS

1. Remove the chassis from the bottom cover and panel. See figure 4, 5 and 6.
2. Connect VTVM across the LINE OUT jack.
3. A 6.3 KHz standard tape shall be used for adjustment.
4. Set the Play Button at play, and volume control for convenient reading at VTVM.
5. Adjust the adjusting screw so that the VTVM indicates the maximum position.

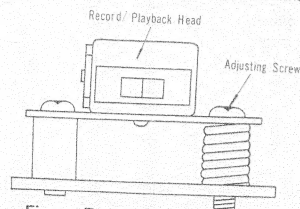


Figure 7. Head Adjustment

## BIAS CURRENT ADJUSTMENT

1. Connect VTVM across the TP12 (L channel) TP22 (R channel).
2. Adjust the bias trap coil (L channel=L101, R channel=L201) so that the VTVM indicates the maximum position, and adjust bias adjusting variable resistor (L channel=VR101, R channel=VR201) so that the voltage drop across the resistor is 45 mV as measured with the VTVM. (RECORD VOLUME=Maximum position)

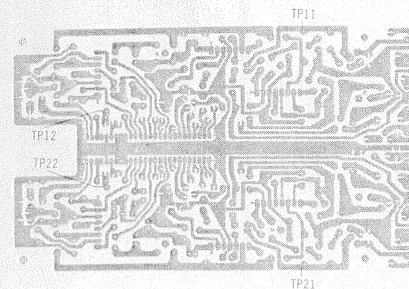


Figure 8.

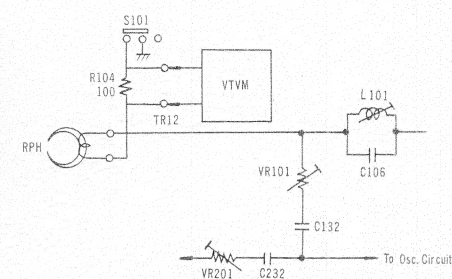


Figure 9. Record Bias Check

## OF PLAYBACK SENSITIVITY AND LEVEL METER

1. Connect the VTVM across the LINE OUT jack. See figure 10.
2. Insert test tape (333 Hz 20 mV), set the Volume Control Knobs in the maximum position, and adjust the semi-fixed resistor (L channel=VR103, R channel=VR203) so that the VTVM indicates 1V.
3. Adjust the semi-fixed resistor. (L channel=VR105, R channel=VR205) so that the level meter indicates OVU.

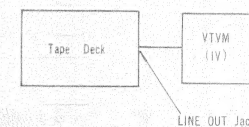


Figure 10.

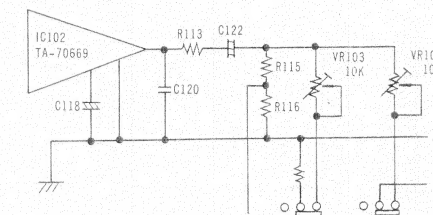


Figure 11.

## ADJUSTMENTS OF RECORD SENSITIVITY AND LEVEL METER

1. Connect VTVM across the TP12 (R channel, TP22)
2. A signal of 1 KHz -65 db is applied through the MIC jack.
3. Adjust the semi-fixed resistor (L channel=VR102, R channel=VR202) so that the voltage drop across the TP12 (R channel=TP22) is 5 mV as measured the VTVM.
4. Adjust the semi-fixed resistor (L channel=VR104, R channel=VR204) so that the level meter indicates OVU.
5. A signal of 18 KHz is applied through the MIC jack.
6. Adjust the trap coil (L channel=L103, R channel=L203) so that the VTVM (LINE OUT) indicates the maximum position.

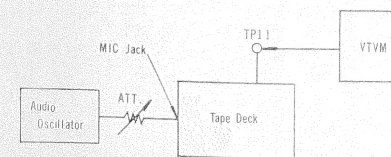


Figure 12.

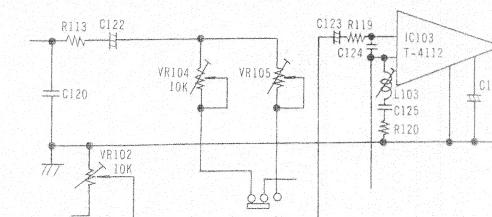


Figure 13.



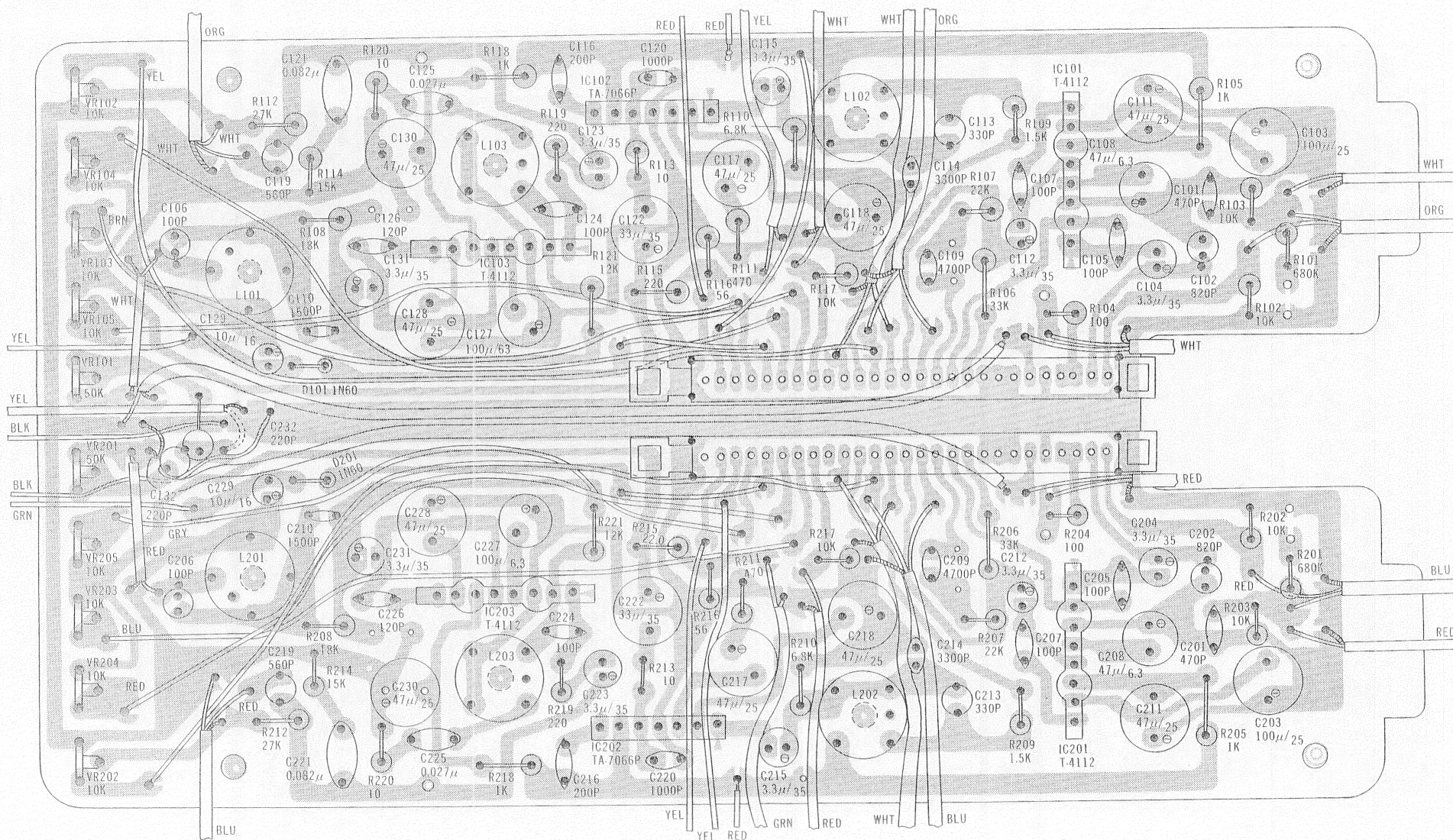


Figure 14. Top View of Main Amplifier Section





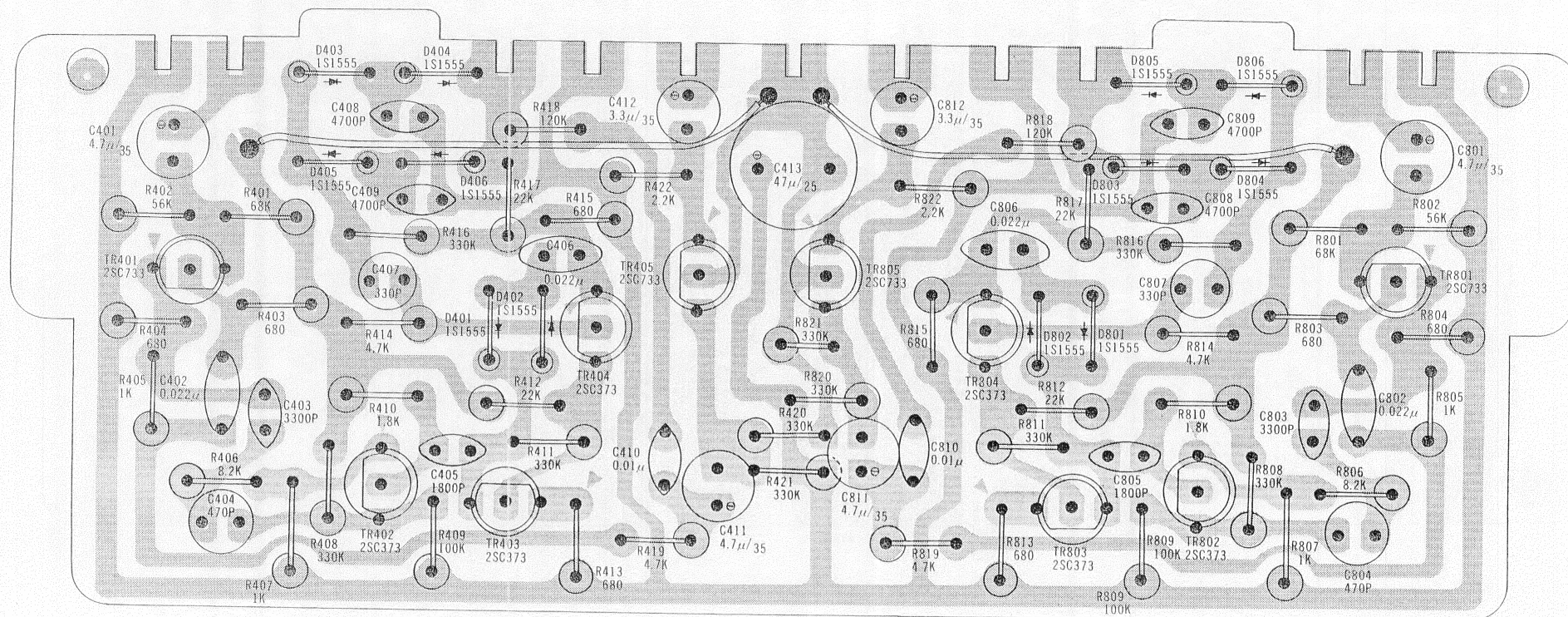


Figure 16. Top View of DNL Section



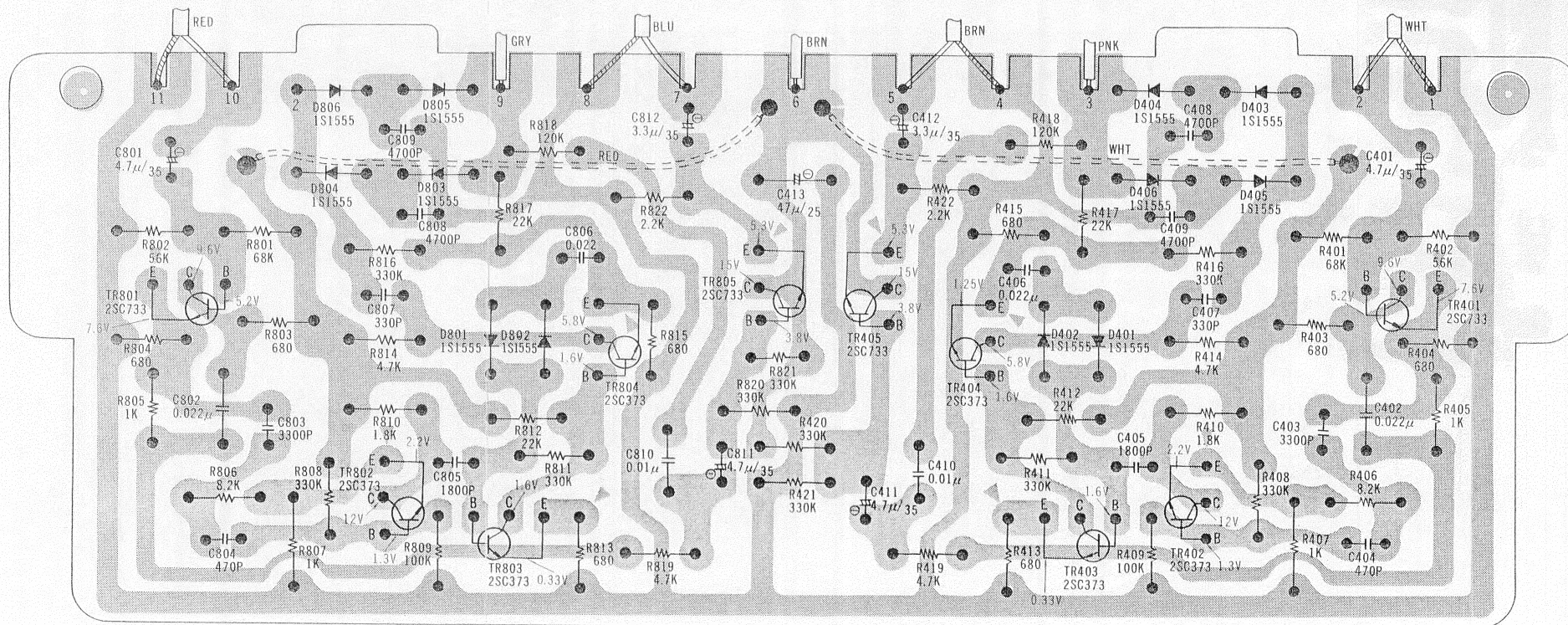


Figure 17. Bottom View of DNL Section

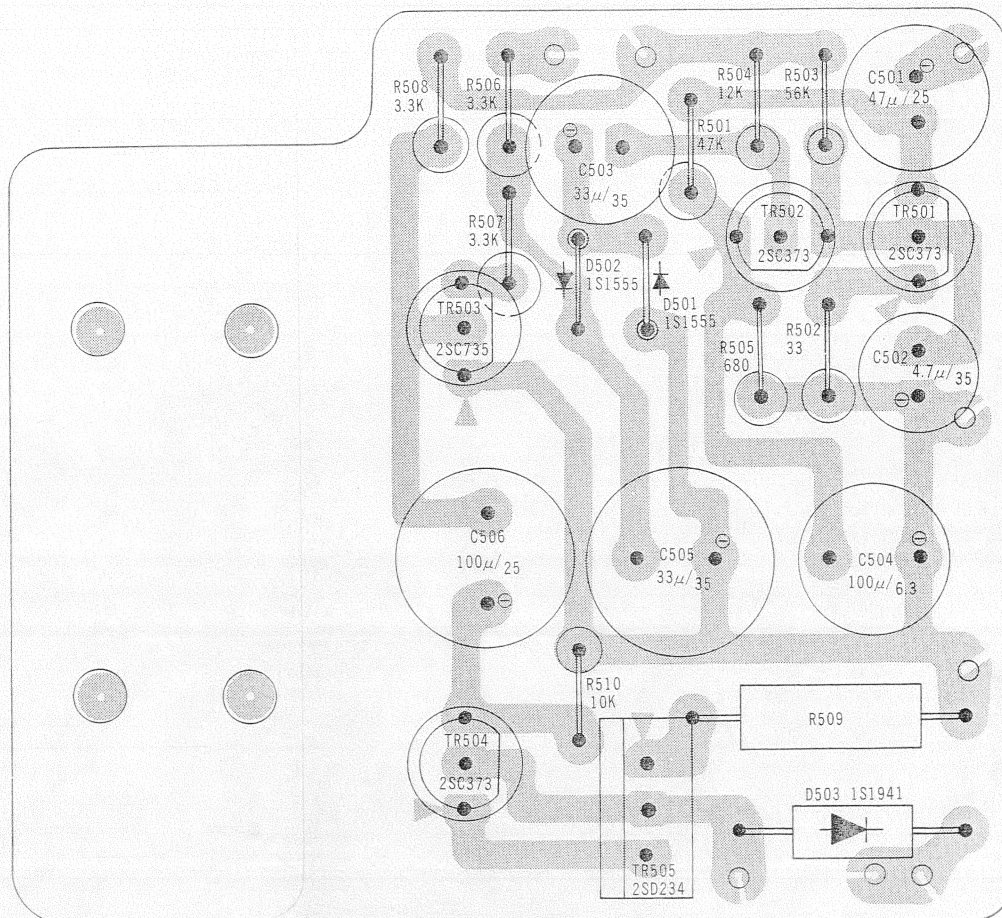


Figure 18. Top View of Auto Stop Section

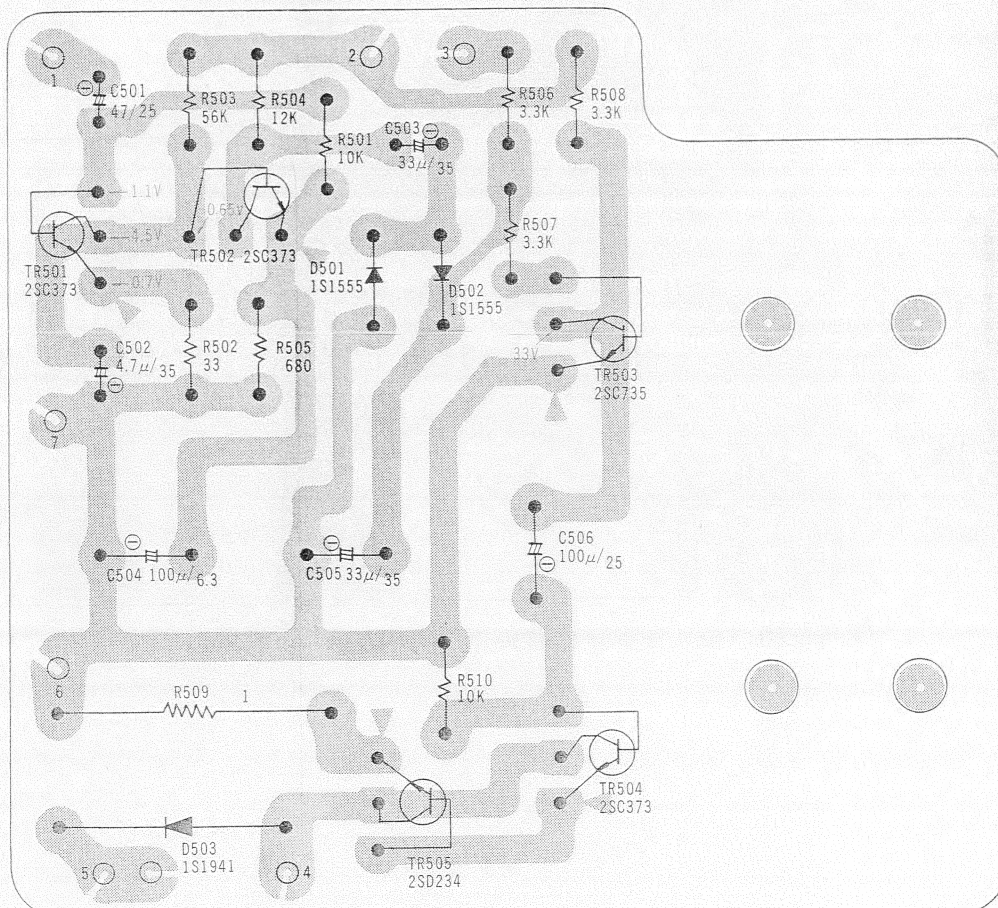


Figure 19. Bottom View of Auto Stop Section



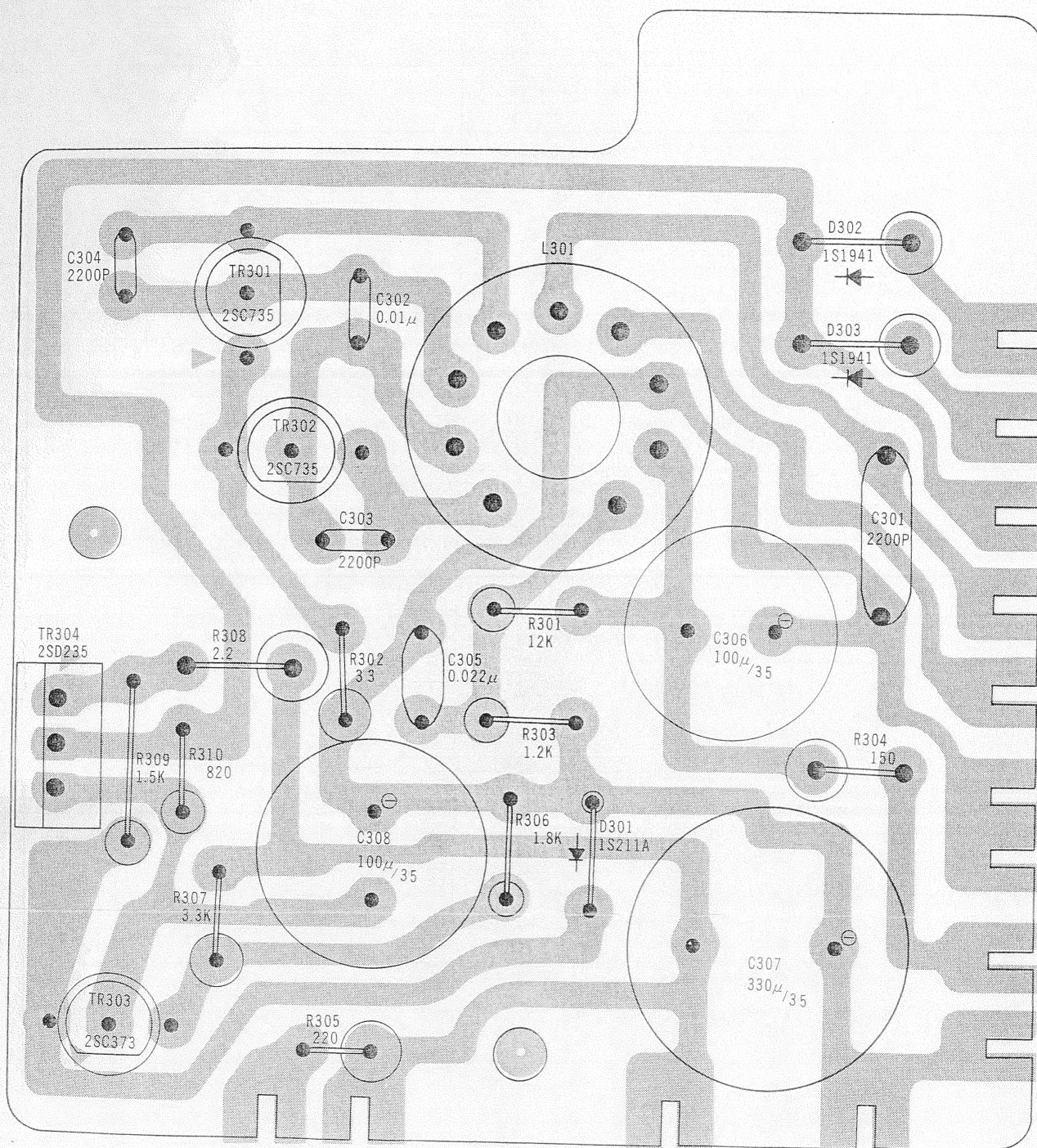


Figure 20. Top View of Regulator and Oscillator Section



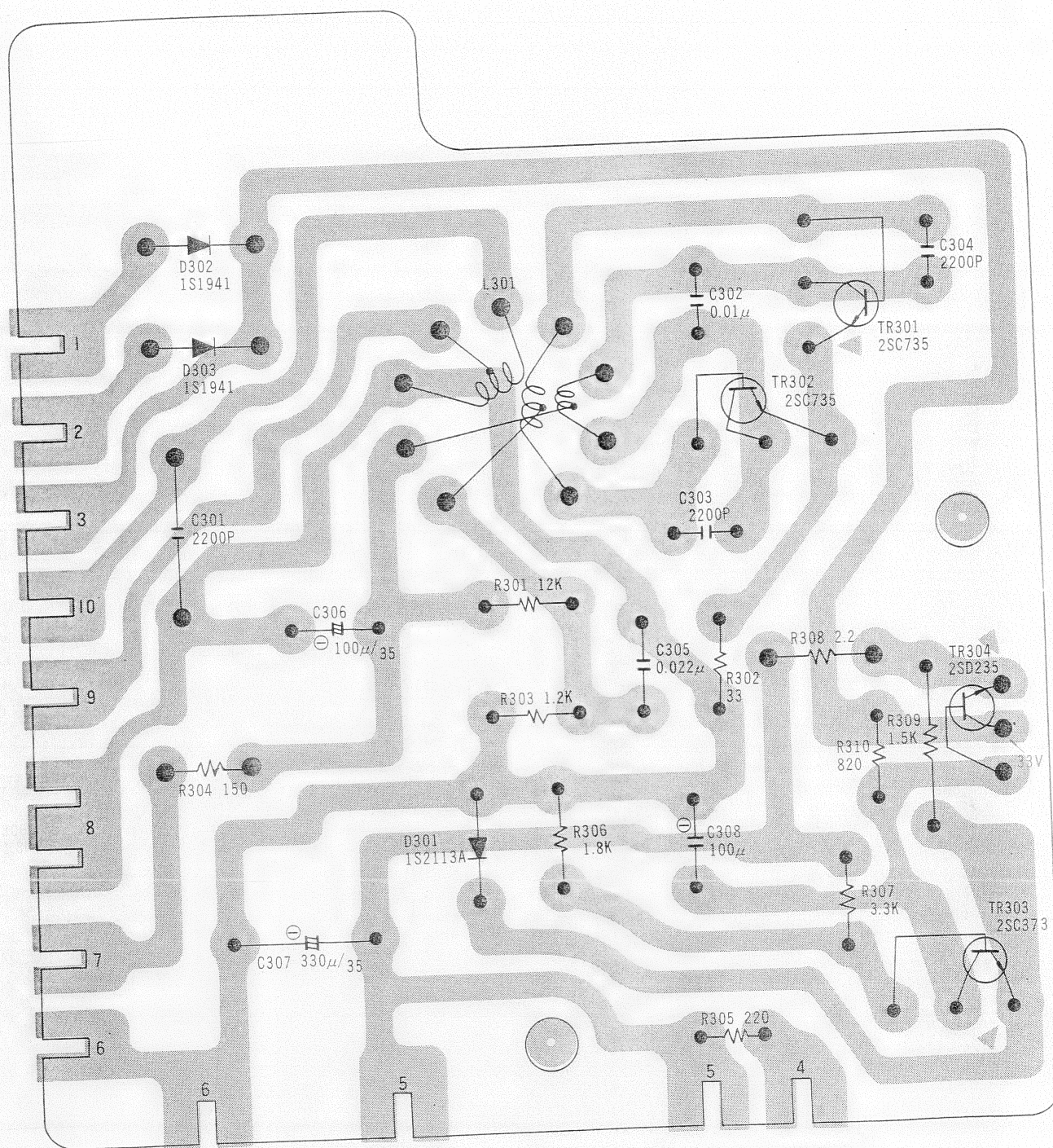
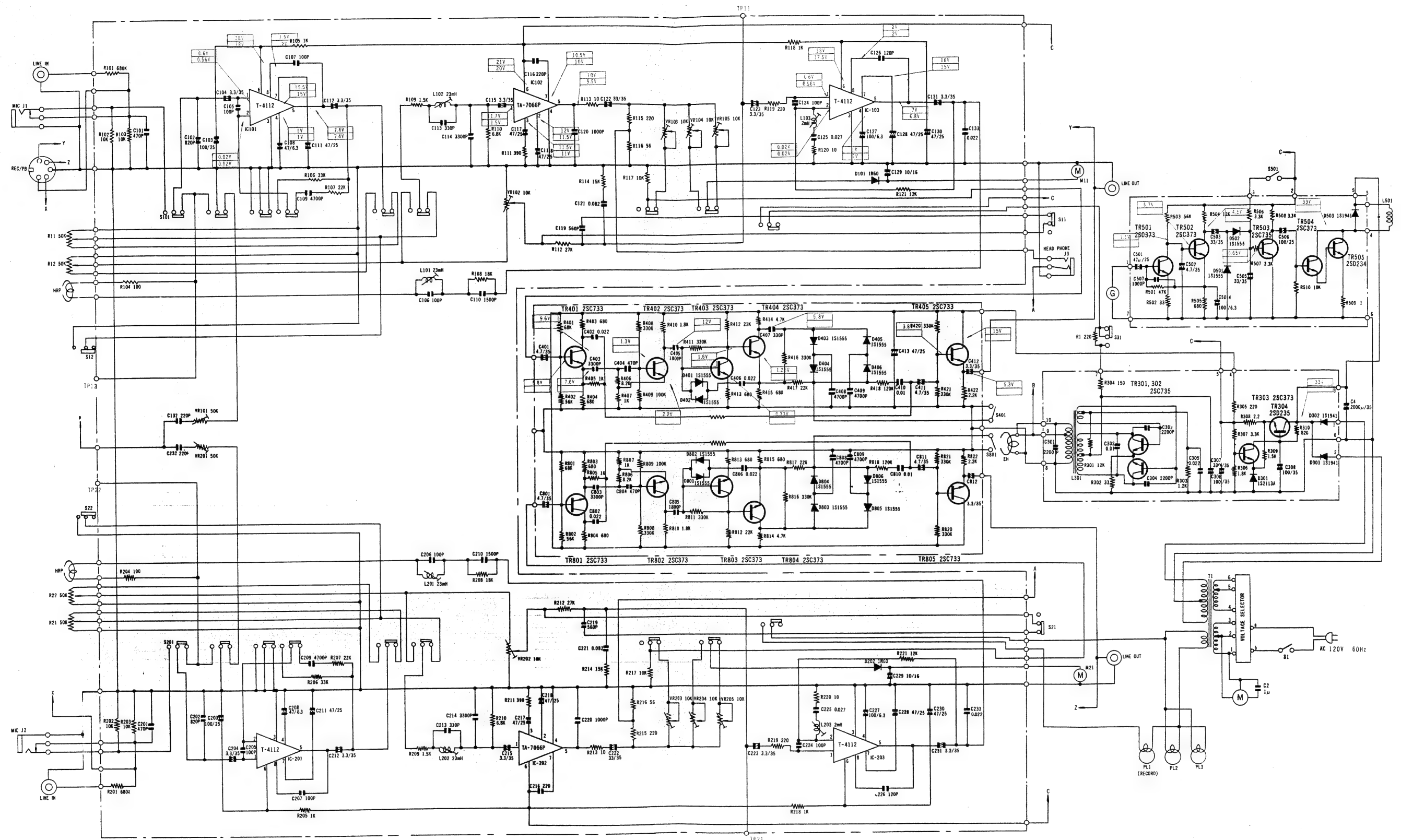


Figure 21. Bottom View of Regulator and Oscillator Section



## NOTES

1. S1 : Lever switch for power
2. S11,21,31,401,801: Lever switch for tape selector/DNL
3. S12,22 : Slide switch for muting
4. S101,201 : Slide switch for record/playback change(Playback position)
5. S501 : Leaf switch for ASO
6. All resistor in ohm. K=1000
7. All capacitor values in farad.
8. The voltages in are under the no signal condition.  
The upper voltage is for playback operation and the lower voltage is for recording operation.

Figure 22. Schematic Diagram

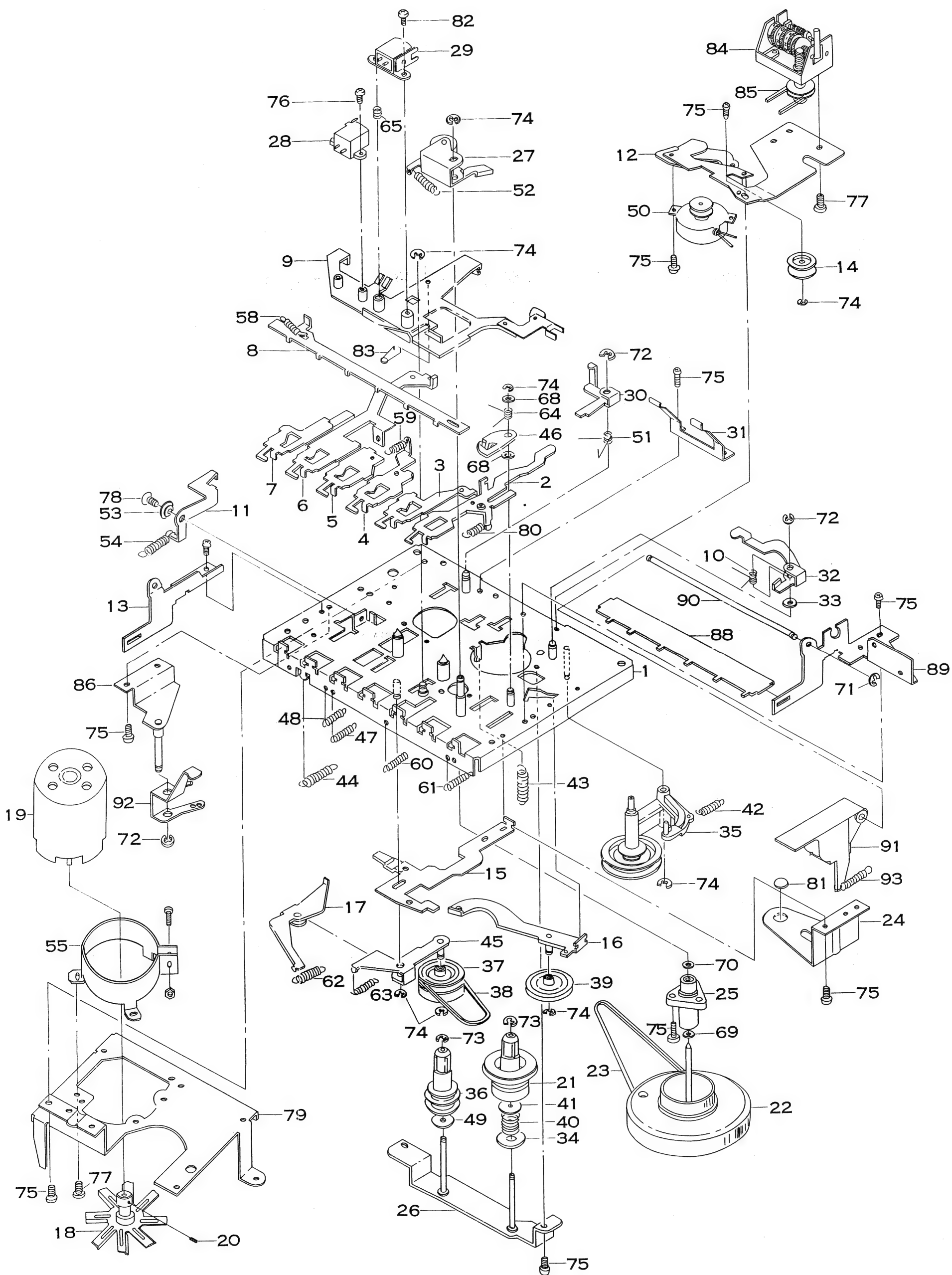


Figure 23. Exploded View-Mechanism



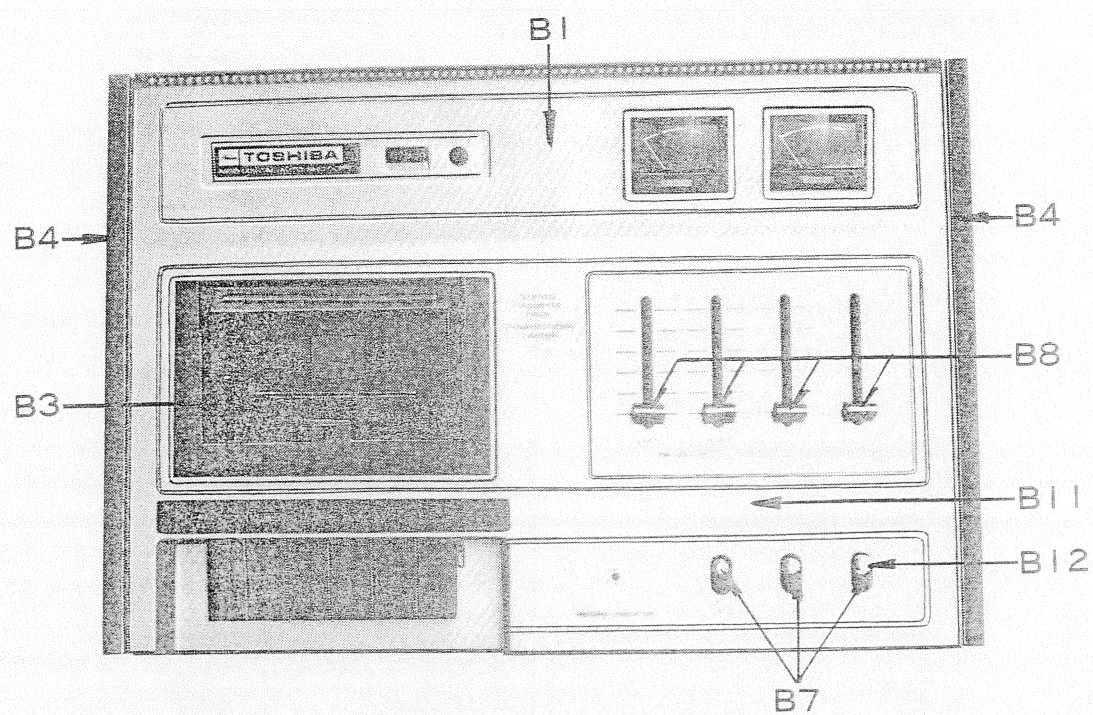


Figure 24.

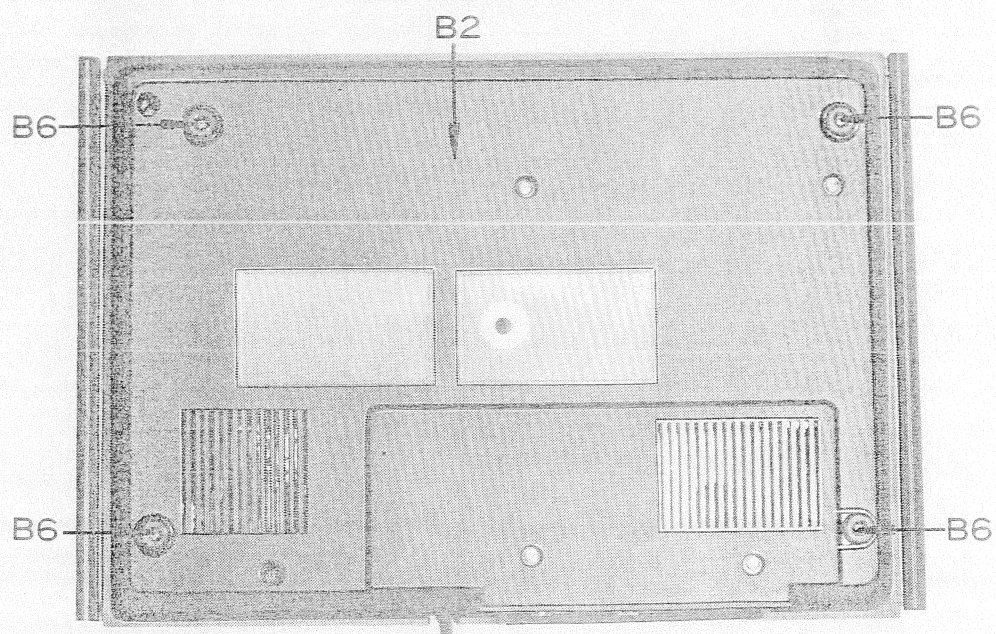


Figure 25.

## PARTS LIST

Symbol No.	Part No.	Description
TRANSISTORS, DIODES & ICS		
TR301,302, TR303,402, 403,404, 501,502, 504,802, 803,804		Transistor, 2SC735-Y Transistor, 2SC373
TR304		Transistor, 2SD235-Y
TR401,405, 801,805		Transistor, 2SC733-Y/GR
TR503		Transistor, 2SC735-GR
TR505		Transistor, 2SD234-O
D101,201		Diode, 1N60
D301		Diode, 1S2113A
D302,303, 503		Diode, 1S1941
D401,402, 403,404, 405,406, 801,802, 803,804, 805,806, D501,502		Diode, 1S1555-JA
IC101,103, 201,203		Diode, 1S1555 Integrated Circuit, T4112
IC102,202		Integrated Circuit, TA7066P
COIL & TRANSFORMER		
T1	22213847	Transformer, Power (110V/120V/220V/240V)
L101,102, 201,202	22232143	Coil, Trap
L103,203	22232107	Coil, Trap
L301	22235146	Coil, Bias Oscillator
L501	22147106	Solenoid
ELECTRICAL PARTS		
	22163332	Jack Assembly
	25865342	Jack Plate
M11,21	22104078	Level Meter
PL1	22113230	Pilot Lamp, Record Indicator
PL2,3	22113066	Pilot Lamp, Level Meter
	22116026	Socket, Lamp
	25858225	Socket, Lamp
J1,2	22163402	Jack, 6 mm
J3	22163183	Jack, 6.5 mm
S1	22145994	Power Switch

Symbol No.	Part No.	Description
S2	22146526	Slide Switch
S11,21,31, 401,801	22146518	Lever Switch
S12,22	22145452	Leaf Switch, Muting
S101,201	22145980	Slide Switch, Record/Playback
S501	22146576	Leaf Switch, ASO
	25854189	Shield Paper
	22176123	Power Supply Cord
	22167145	Censent, Voltage Selector
CAPACITORS		
C2	22370106	Metallized Mylar, 1 mfd 250 WV
C4	22420104	Electrolytic, 2000 mfd 35 WV
C101,201,	22341471	Ceramic, 470PF 50WV
C102,202	22382821	Polystyrene 820PF 50 WV
C103,203, 506	22446101	Electrolytic, 100 mfd 25 WV
C104,112, 115,123, 131,204, 212,215, 223,231, 412,812	22447339	Electrolytic, 3.3 mfd 35 WV
C105,107, 124,205, 207,224	22362101	Ceramic, 100PF 50 WV
C106,206	22382101	Polystyrene, 100PF 50 WV
C108,208	22442470	Electrolytic, 47 mfd 6.3 WV
C109,209, 408,409, 808,809	22373472	Mylar, 4700PF 50 WV
C110,210	22373152	Mylar, 1500PF 50 WV
C111,117, 118,128, 130,211, 217,218, 228,230, 413	22446470	Electrolytic, 47 mfd 25 WV
C113,213, 407,807	22382331	Polystyrene, 330PF, 50 WV
C114,214, 403,803	22373332	Mylar, 3300PF 50 WV
C116,216	22360104	Ceramic, 200PF 50 WV
C119,219	22382561	Polystyrene, 560PF 50 WV
C120,220, 507	22373102	Mylar, 1000PF 50 WV
C121,221	22372823	Mylar, 0.082 mfd 50 WV

## PARTS LIST

Symbol No.	Part No.	Description
C122,222, 503,505	22447330	Electrolytic, 33 mfd 35 WV
C125,225	22372273	Mylar, 0.027 mfd 50 WV
C126,226	22362121	Ceramic, 120PF 50 WV
C127,227, 504	22442101	Electrolytic, 100 mfd 6.3 WV
C129,229	22445100	Electrolytic, 10 mfd 16 WV
C132,231	22381221	Polystyrene, 220 PF 50 WV
C133,233	22373223	Mylar, 0.022 mfd 50 WV
C301	22370112	Mylar, 2200PF 50 WV
C302	22372103	Mylar, 0.01 mfd 50 WV
C303,304	22373222	Mylar, 2200PF 50 WV
C305,402, 406,802, 806	22373223	Mylar, 0.022 mfd 50 WV
C306,308	22447101	Electrolytic, 100 mfd 35 WV
C307	22447331	Electrolytic, 330 mfd 35 WV
C401,411, 502,801, 811	22447479	Electrolytic, 4.7 mfd 35 WV
C404,804	22382471	Polystyrene, 470PF 50 WV
C405,805	22372182	Mylar, 1800PF 50 WV
C410,810	22373103	Mylar, 0.01 mfd 50 WV
C501	22446470	Electrolytic, 47 mfd 25 WV
RESISTORS		
(All resistors are 1/8W, 10%, carbon film unless otherwise noted.)		
R1,305	22563221	220 ohm, 1/8W, Carbon Composition
R11,12,21, 22	22657041	50 Kohm, Variable Resistor
R101,201	22554684	680 Kohm
R102,103, 117,202, 203,217	22554103	10 Kohm
R104,204	22554101	100 ohm
R105,118, 205,218, 405,407, 805,807	22554102	1 Kohm
R106,206	22554333	33 Kohm
R107,207, 412,812	22554223	22 Kohm
R108,208	22554183	18 Kohm
R109,209, 309	22554152	1.5 Kohm
R110,210	22554682	6.8 Kohm

Symbol No.	Part No.	Description
R111,211	22554471	470 ohm
R112,212	22554273	27 Kohm
R113,120, 213,220	22554100	10 ohm
R114,214	22554153	15 Kohm
R115,119, 215,219	22554221	220 ohm
R116,216	22554560	56 ohm
R121,221, 301	22554123	12 Kohm
R302,502	22554330	33 ohm
R303	22554122	1.2 Kohm
R304	22563151	150 ohm, 1/2W, Carbon Composition
R306,410, 810	22554182	1.8 Kohm
R307,506, 507,510	22554332	3.3 Kohm
R308	22563229	2.2 ohm, 1/2W, Carbon Composition
R310	22554821	820 ohm
R401,801	22554683	68 Kohm
R403,404, 413,415, 505,803, 804,813, 815	22554681	680 ohm
R406,806	22554822	8.2 Kohm
R408,411, 416,420, 421,808, 811,816, 820,821	22554334	330 Kohm
R409,809	22554104	100 Kohm
R414,419, 814,819	22554472	4.7 Kohm
R417,817	22554223	22 Kohm
R418,818	22554124	120 Kohm
R422,822	22554222	2.2 Kohm
R501	22554473	47 Kohm
R503,402, 802	22554563	56 Kohm
R504	22554562	5.6 Kohm
R508	22563332	3.3 Kohm, 1/2W, Carbon Composition
R509	22563109	1 ohm, 1/2W, Carbon Composition
VR101,201	22658185	50 Kohm, Semi-fixed Resistor
VR102,103, 104,105, 202,203, 204,205	22658184	10 Kohm, Semi-fixed Resistor



## PARTS LIST

Symbol No.	Part No.	Description
MECHANICAL PARTS		
10	25773182	Spring, Switch Lever
14	25751390	Pulley, Counter Belt
18	25713346	Motor Pulley, 60 Hz
19	22125162	Motor
21	25712214	Hub Plate, Take-up
22	25717749	Flywheel Assembly
23	25755239	Belt, Drive
25	25718135	Bearing, Capstan Shaft
27	25717266	Pressure Roller
28	22218112	Erase Head
29	22217190	Record/Playback Head
31	25774283	Brace, Cassette
33	25764402	Washer
34	25764246	Nylon Washer
35	25713343	Pulley, Take-up
36	25712222	Hub Plate, Supply
37	25713312	Pulley, Rewind
38	25755171	Belt, Rewind
39	25713281	Idler, Fast Forward
40	25772154	Spring, Take-up Hub Plate
41	25764298	Teflon Washer
42	25771519	Spring, Take-up Pulley
43	25771450	Spring, Switch Slider
44	25771403	Spring, Operation Plate, Stop
47	25771405	Spring, Operation Plate, Rewind
48	25771520	Spring, Record Lever
49	25764196	Nylon Washer
50	22125609	AC Generator
51	25773152	Spring, Erase Protection Lever
52	25771453	Spring, Pressure Roller
54	25771412	Spring, Cassette-up
58	25771409	Spring, Lock Plate
59	25771410	Spring, Head Chassis
60	25771406	Spring, Operation Plate, Play
61	25771407	Spring, Operation Plate, Fast Forward
62	25771411	Spring, Lever, Fast Forward
63	25771451	Spring, Lever, Rewind
64	25773161	Spring, Pause Lever
65	25772240	Spring, Record/Playback Head
68	25764400	Nylon Washer
69	25764398	Washer, Flywheel
70	25764396	Washer, Capstan Shaft
80	25771408	Spring, Pause Lever
81	25764301	Nylon Sheet, Capstan Shaft
83	25773164	Spring, Head Chassis

Symbol No.	Part No.	Description
84	25873143	Tape Counter
85	25755240	Belt, Counter
91	25826412	Operation Button
93	25771518	Spring, Operation Button
CABINET PARTS		
B1	25811305	Panel Assembly
B2	25812419	Bottom Cover Assembly
B3	25812418	Cassette Cover Assembly
B4	25821324	Side Plate, Wood
B5	25773178	Spring, Cassette Cover
B6	22874027	Foot, Rubber
B7	25833192	Sheet, Lever Switch
B8	25816332	Knob, Volume
B9	25827033	Model No. Plate
B10	25824469	Plate, Caution
B11	25826379	Knob, Lever Switch
B12	25826380	Knob, Power
ACCESSORIES		
	22954070	Owner's Manual
	22105282	Audition Tape
	22170109	Patch Cord
	22990018	Cleaner, Head
	22100011	Warranty Card